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L. O. HOWARD, Entomologist and Chief of Bureau.

TWO DESTRUCTIVE TEXAS ANTS.

BY

W. D. HUNTER,
In Charge of Southern Field Crop Insect Investigations.

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TWO DESTRUCTIVE TEXAS ANTS.

By W. D. HUNTER,
In Charge of Southern Field-Crop Insect Investigations.

THE CUTTING OR PARASOL ANT.

(*Atta texana* Buckley.)

The so-called cutting or parasol ant (*Atta texana* Buckley) is well known to residents of the region in which it occurs. The colonies are located in sandy soil, generally in the timber, and consist of low mounds of considerable extent covered with numerous craters about 18 inches in diameter. The ants have the habit of cutting the leaves from a great variety of plants and of carrying them to their nests. In many cases the attack is concentrated on one tree, which may be entirely defoliated in a single night. The species is of a reddish-brown color. The colonies contain individuals showing great differences in size, as will be explained later.

DISTRIBUTION.

The range of this species is rather restricted. It is known only from a limited area in south-central Texas. This area extends from the Brazos River as far north as Waco to the Gulf, westward as far as San Antonio, and southward to the vicinity of Alice. The ant is most common in the valleys of the Colorado, Guadalupe, Comal, and San Antonio Rivers. In these situations it is evidently increasing in numbers from year to year. In many cases the nests occupy the land practically continuously for many miles up and down the valleys.

HABITS.

The nests consist of underground chambers with several openings or craters. The surplus openings seem to be provided for the purpose of ventilating the underground passages. The nests are located

generally in sandy soil. The more compact soils seem to be unfavorable for their construction. A very common location for a colony is a sandy promontory, well lighted by the sun, in the bend of a river.

The large irregular mounds are due to the leveling by the wind and rains of the circular ridges of sand, brought from beneath the surface, which surround the openings. Consequently, each of the mounds is an indication of the activity of the ants for many years. Beneath these mounds are numerous chambers connected by narrow passages, and there may be direct connection by these channels over an area of several hundred square feet.

The habits of this insect have attracted great attention from scientists and others. The ants cut the leaves from trees and carry them to the nests. Each leaf is finely divided and made into small pellets. In this work the mandibles and legs of the ants are utilized. The small masses are placed upon the so-called fungus garden, where they furnish a growing medium for the growth of a fungus which furnishes the colony with food. As the supply of fungus is consumed the ants add to the old mass, so that eventually the nests are found to contain large spongy formations on the outer portion of which the slender threads of the fungus are growing. Evidently the ants exercise great care in preventing the contamination of the fungus garden by any but the sole species of fungus that is utilized.

The ant is active throughout the greater part of the year. In fact, it becomes quiet for only a very short time when the winter cold is most severe. It is disinclined to work during very hot weather. During the cooler months its activity extends throughout the day, but during the summer it is confined to the night. The distance over which foraging expeditions take place may be 200 yards or even more. Practically all species of plants seem to be suitable for food, although it is noticeable that only one species is attacked at a time. Dr. W. M. Wheeler, who has made very careful studies of these ants, has noted that the same colony may feed upon a wide variety of plants at different times, but he never observed the individuals of a colony collecting different varieties at the same time.[1] Among cultivated crops, cotton, corn, fruit trees, sorghum, and many others are attacked. Among wild plants, forest trees are favored, and frequently the Spanish moss is used. The various species of oaks seem to be more or less immune, either on account of the texture of the leaves or the tannic acid they contain. This immunity is by no means absolute, however, as Dr. Wheeler and Mr. J. D. Mitchell have observed the ants making use of such rough leaves as those of the live oak.

[1] Wheeler, W. M. The Fungus-Growing Ants of North America. Bul. Amer. Mus. Nat. Hist., vol. 23, Article XXXI, pp. 729–742.

The colonies of this ant are formed by the flight of the females to some point not far distant from the nest. The queen alights, digs beneath the surface, deposits a small quantity of the fungus from the original nest, and on it deposits a number of eggs.

FORMS.

This ant occurs in five forms, namely, soldiers, large workers (media), small workers (minima), males, and females. The soldiers are from 10 to 12 mm. in length, with enormously developed heads. The large workers, or media, resemble the soldiers, although the head is somewhat smaller, and the length of the body is between 3 and 9 mm. The small worker forms, called minima, are from 1.5 to 2.5 mm. in length. The head is still smaller than in the media. Each of these three forms has a special function in the nest. The soldiers are concerned primarily with the protection of the nest. They do not sting, but bite with their mandibles, which are strong enough to draw blood. The large workers and small workers are busied principally with the gathering of leaves for the fungus garden and the preparation of the material on which the fungus grows. The remaining forms are the males and females. These are much larger than the other forms. The female is about 18 mm. in length. The color is dark brown, although the legs are somewhat reddish. The body is covered with dense tawny hair. The wings, which are shed soon after the flight of the queen, are reddish brown, especially along the anterior borders. The males are from 13 to 14 mm. long with a head of small size which contrasts greatly with that of the worker forms. The body is densely covered with long yellowish hairs, as is the case with the females.

REPRESSION.

The fact that this ant does not continue to attack one species of plant continuously, but changes from one to another at frequent intervals, causes it to be of less importance in the destruction of vegetation than it would be otherwise. Nevertheless, the damage to growing crops is frequently heavy, and complaints have become more numerous in recent years on account of the greater abundance of the ants. In many places considerable areas of land are not planted to crops on account of the danger of attack. In all such situations it is necessary to resort to repressive means.

The best method of control is undoubtedly by means of potassium cyanid.[1] Mr. J. D. Mitchell has conducted the experiments upon

[1] The use of potassium cyanid in water solution against ants was first followed by Messrs. R. S. Woglum and Wm. Wood. (See Journal of Economic Entomology, vol. 1, pp. 318–349, 1908.) Mr. H. G. Marsh has also used it. (See Bul. 64, Pt. IX, U. S. Dept. Agr., Bur. Ent., pp. 74–78, 1910.)

which this conclusion is based. He used 98 per cent potassium cyanid at the rate of 1 ounce to 1 quart of water. After careful mixing this liquid was poured into each of the openings in several nests, a quart to each opening. In every case it was found that the destruction of the colony followed after one or two applications. The cost of this method is small, but of course will assume considerable proportions in areas where the ants are very numerous. Even under such conditions it will undoubtedly well pay for the expense and is advised above all methods that can be followed.

The use of carbon bisulphid is not practical on account of the very extensive excavations the ants make in the sand. Some may be killed, but effective work can not be done unless the insecticide is forced into the earth by pressure, and this requires special apparatus. Moreover, the expense would be much greater than in the case of the cyanid method just described.

Some years ago certain persons in southern Texas followed the destruction of this ant as a regular business. They used sulphur and a special apparatus for forcing the fumes into the nests. The machine consisted of an oven in which the sulphur was burned. The fumes were passed through a pipe by forced draft, and the end of this pipe was inserted into the ground in the middle of the colony. Before the oven was started all of the openings of the nest were carefully closed. It is said that remarkable success accompanied this method. It may be found to be advisable to use this method for large areas of the infested lands or where several planters can cooperate.

Mr. C. L. Marlatt has described a method of destruction of ants which is in use in Cuba:

> It consists in digging a hole 6 feet deep by 3 or 4 feet wide in the midst of the colony. This hole is filled with dry brush and a roaring fire started. Into this is then poured a bucketful of powdered sulphur. The opening is closed with a large iron plate. Through a hole in the center of this plate air is forced down into the burning mass with a large bellows.[1]

THE AGRICULTURAL OR HILLOCK ANT.

(*Pogonomyrmex barbatus molefaciens* Buckley.)

The nests of the agricultural or hillock ant (*Pogonomyrmex barbatus molefaciens* Buckley) are conspicuous in the territory in which they occur on account of the fact that the ants do not allow any vegetation to grow in a circular area about them. The mounds are 15 inches or more in diameter and are frequently covered with particles of earth or sand from beneath the surface which contrast strongly with the surrounding soil. The bare areas around the mound may be 10 feet or more in diameter.

[1] See W. M Wheeler: Ants, their structure, etc., p. 577, 1910.

DISTRIBUTION.

The agricultural ant occurs from the Brazos River westward. West of San Antonio it is replaced by closely allied forms. Farther north, in Kansas and Nebraska, a distinct species (*P. occidentalis* Cress.) occurs. The agricultural ant is conspicuously a resident of open places and does not occur in wooded localities.

HABITS.

This ant swarms early in the season, generally after a rain. At such times the males and females come out of the nest in great numbers, covering the ground for many feet. Mating takes place at this time, after which the females fly away. When they alight their wings are cast and they begin to dig a cell for a new colony. The males after mating are driven away by the workers or killed if they persist in returning to the nest. At the time of this swarming multitudes of the ants are destroyed by birds and horned lizards.

Many years ago it was announced that the agricultural ant actually plants certain grasses in order to obtain quantities of seed to use in provisioning the nests. In fact, it was on this supposition that one of the common names which have come into use was given it. Upon careful investigation, however, it was found that the ant does not plant seed intentionally, although it undoubtedly does so accidentally. The facts were brought out by Prof. W. M. Wheeler. The seeds of several species of grass and common weeds are taken into the nests. When the moisture is too great in the nest some of these seeds sprout and thus become unsuitable for food. Under such circumstances the ants carry out the sprouted seeds and deposit them in the immediate vicinity of the nest where many take root and grow. Of course, this can not be considered intentional planting of the seeds, because the ants deal with the sprouted grain exactly as they would with any substance that was unsuitable in their nests; that is, they simply carry it out and throw it away.

DAMAGE.

The economic importance of the agricultural ant is due to the fact that it will not allow vegetation to grow in the immediate vicinity of its nest and to its powerful sting which it uses on the slightest provocation. If the colonies happen to be in fields such as alfalfa, corn, or cotton, the area of loss may amount to considerable, and the same is true to a certain degree of pasture and range lands. Moreover, in fields which are mowed the mounds interfere with the working of the machine, and the ants are likely to attack the horses. There is some degree of compensation for the loss of the land cleared by the ants. It will be noted that in a circle just outside of the area

that is cleared the plants grow with great luxuriance. Frequently these plants become quite conspicuous in the field. This redoubled growth is due apparently to the fact that the underground tunnels of the ants loosen up the soil and have somewhat the effect of deep plowing. It is not likely that the increased growth under these conditions offsets entirely the loss in the area where no plants are allowed to grow, but it is sufficient to reduce the importance of the insect to some extent. Mr. J. D. Mitchell, who has made many careful observations on this species, believes that the actual damage inflicted is generally overestimated.

The sting of the agricultural ant is at least as severe as that of a bumblebee. It is speedily inflicted on any animal that approaches the nest. Consequently, colonies located in the vicinity of houses or on roads or paths frequently become decided nuisances. The best local applications for stings are aqua ammonia or bicarbonate of soda (baking soda). When fainting or dizziness occurs, as is frequently the case, a few drops of ammonia taken internally will be helpful.

NATURAL ENEMIES.

Natural enemies exert some repressive influence upon agricultural ants. The most important enemy among the birds is the great-tailed grackle (*Megaquiscalus major macrourus*), commonly known as the jackdaw. The following additional Texas birds are known to prey upon species of Pogonomyrmex, according to records in the Biological Survey: Upland plover (*Bartramia longicauda*), burrowing owl (*Speotyto cunicularia hypogæa*), Texas nighthawk (*Chordeiles acutipennis texensis*), scissor-tailed flycatcher (*Muscivora forficata*), kingbird (*Tyrannus tyrannus*), redbird (*Cardinalis cardinalis*), and mockingbird (*Mimus polyglottos*). The horned lizard (*Phrynosoma cornutum*) includes agricultural ants as a part of its regular diet.

REPRESSION.

As in the case of the cutting ant, the destruction of this species can best be brought about by the use of the solution of potassium cyanid in water. Mr. J. D. Mitchell conducted experiments at Victoria, Tex., which showed that this was a perfectly satisfactory method. It is much cheaper and easier of application than in the case of the cutting ant on account of the fact that the underground portion of the nest is much less extensive. A pint of liquid is sufficient for even a large colony, though sometimes a second application may be necessary.

Carbon bisulphid is also a good remedy and can be applied in a very simple manner. All that is necessary is to pour about 2

ounces into the opening of the nest. The opening need not be closed. As the gas is much heavier than air, it sinks into the innermost recesses and kills all of the ants in the colony. Setting fire to the liquid is of no benefit. In fact, it is likely to lessen its efficiency. The poison may be applied at any time of the day, regardless of the number of the ants that are outside the nest. The destruction of the colony depends upon the killing of the queen, and she remains in the nest at all times, except when the swarming flight is under way, for a very short time in the spring.

Sometimes Paris green or other arsenicals are used in the attempt to control this species. They are generally applied by simply pouring a handful into the openings. Many of the ants are killed, but a large part of the brood is not affected, and the colony soon becomes as numerous as ever. In some cases where this method has been followed persistently the ants have moved their nest a few feet away and have become reestablished perfectly in a short time. For these reasons the use of arsenicals can not be considered satisfactory.

Another method sometimes followed, which is of little practical use, is trapping the ants in bottles. If a large bottle is buried in the ground in the vicinity of the nest with the neck flush with the surface the ants soon begin an exploration and fall inside. The noise they make in the bottle attracts many others. In this way in the vicinity of a populous colony a large bottle may be filled in a short time. The objection to this procedure is that it only reduces the strength of the colony. The immature stages and the queen are not affected, and the colony soon regains its former numbers.

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *January 18, 1912.*

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